

CELLULAR SURGERY UTILIZING CONFOCAL MICROSCOPY

ABSTRACT

An improved system for cellular surgery which includes a laser for producing a laser beam, and confocal optics for scanning and focusing the laser beam in tissue and generating confocal images of the tissue in accordance with returned light from the tissue. The confocal images are visualized on a display. The system includes a controller for enabling the operator to select one or more cells of the tissue in the displayed confocal images for surgical treatment. The controller operates the laser and confocal optics in a first mode to treat the tissue when the confocal optics focus the laser beam at least one region associated with the selected cells in the tissue, but at all other times operates the laser and confocal optics in a second mode which does not damage the tissue. The treatment may be localized to concentrate the energy of the laser to the region including the selected cell or cells, or the treatment may be non-localized to distribute the energy of the laser to the region which includes the selected cell(s) and also the cells of the tissue surrounding such selected cell(s). In another embodiment, an apparatus is provided having a confocal imaging system, which focuses a first laser beam through confocal optics to tissue and provides confocal images of the tissue, and a treatment system which focuses a second laser beam through the confocal optics coaxial with the first laser beam for treating at one or more selected locations in the imaged tissue.